REMARKS

Claims 1-8, 15-20, 26-33, 35 and 38 to 66 are pending in the application. Claims 9-14, 21-25, 34, 36, 37 are canceled. All the pending claims have been rejected by the Examiner.

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

Claim Objections

In paragraph 1, the Examiner points out an informality in claim 1. This is corrected.

Claim Rejections

Rejections under 35 USC 112

Claims 15-20, 26-29, 55 and 57-62 are rejected for failing to comply with the written description requirement.

In particular the Examiner objects that the feature of claim 15, of "said first and second data acquisition processes being respectively different illumination type" is not disclosed in such a way as to indicate to the person skilled in the art that the inventor, at the time the application was filed, had possession of the claimed invention.

With all due respect, the attention of the Examiner is drawn to the first paragraph of the background where it is stated:

> "In data gathering technology, and more particularly in image gathering technology, it is possible to image a given view using a number of different image gathering techniques. For example, a standard light microscope may be able to image a slide using bright field illumination and dark field illumination."

That is to say it is clearly not only disclosed, but admitted as prior art, that it is known to use different illumination types, vis light field and dark field, for data gathering using a single microscope.

The Examiner further objects that the feature of claims 55 and 61, namely that one of the data acquisition processes uses transmitted light and the other uses reflected light, is likewise not supported. However, transmitted and reflected light as alternatives are mentioned on page 2 lines 3 and 4 as being part of the admitted prior art. Also see page 5 second paragraph, which states the same about the invention. More to the point, the attention of the Examiner is drawn to page 27 line 18, where transmission and fluorescence microscopy are mentioned as paired alternatives. Fluorescence microscopy involves illumination from the side of the viewing device and transmission microscopy involves illumination from the opposite side.

Claims 1-8, 15-20, 26-33, 35, 38-42, 45-47, and 51-66, are rejected under 35 USC 112, second paragraph as being indefinite.

Claim 1 is now amended to remove the phrase "such as". It is respectfully pointed out however that the MPEP guidelines concern the usage of such as for giving examples, thus "a length such as five millimeters", thereby giving doubt as to whether the example given is a claimed limitation. In the present case the usage of "such as" is in the sense of "thereby". However for the purpose of expediency, the term "thereby" has been substituted.

Claim 6 is rejected due to lack of antecedent basis of the feature "field data display device". It is respectfully pointed out that claim 6 is dependent from claim 1, and claim 1 line 13 explicitly recites a field data display device. Therefore it is believed that this rejection is overcome.

In claim 15, the phrase "such as" cannot be found on line 8 in applicant's version. "Said changes" has been amended to "said change", and the phrase over lines 8-11 has been clarified.

The remaining claims have been clarified to deal with the Examiner's comments.

Rejections under 35 USC 102(e) and USC 103

Claims 40, 41 and 45-49 are rejected under 35 USC 102(e) as being anticipated by Bacus et al. The remaining claims are rejected under 35 USC 103.

All of the independent claims have been amended to incorporate the feature taught under the heading of "fine registration" in the description on page 22 line 20 – page 23 line 8. In this section it is described how an object, that is a feature, within an image, is selected as a reference and is identified in subsequent images to provide the correspondence. Thus there is provided a two level location system. At a high level the slide provides a co-ordinate system, and at the fine level, identified features on the sample being imaged are used to place cross-hairs which provide a "sample intrinsic" co-ordinate system.

It is believed that the present amendment, as now applied to the independent claims, to positively recite this feature, overcomes the Examiner's objection on page 22 of the Office Action where he states that Bacus does provide a co-ordinate system which is intrinsic to the image. The objection is overcome since the claim now recites a co-ordinate system which is intrinsic *to the sample*, and this is not taught in Bacus or in any of the other citations.

The independent claims have all been amended to clearly recite the feature of using points on the sample itself for matching between the different images of the same sample.

The claims thus now point out the feature disclosed in the registration and fine tuning embodiment described in relation to Fig. 4 of the present application. As explained in the application in respect of the embodiment of Fig. 4, and as was explained in the previous response, an image is taken of an object, typically mounted on a slide. An intrinsic or internal reference system is constructed based on features of the sample. If it is desired to automate the process then those features may be identified by state of the art image processing techniques.

Use of such an internal reference system allows subsequent changes to be made to the slide and for the changes not to interfere with the system's ability to re-register. Thus an image can be taken and then changes made to the object and a new image taken, or the same object can be imaged in different ways and the two images matched. This can be done using an ordinary microscope and without any effort in aligning the slide on the stage. The matching is carried out automatically, and is effective despite the changes being made to the image.

In the previous response the point was illustrated with reference to attached figures 1, 2 and 3, and the Examiner is referred again to these figures which provide an understanding of the utility of the present invention.

Bacus et al, as discussed in the previous response, discloses imaging at low resolution over a relatively large area. The user finds a region of interest using a low resolution image, selects the region of interest using a marker or

cursor and then is provided with a corresponding high resolution image of the region of interest. In the preferred embodiment the lower and higher resolution images are obtained using different power lenses on the same microscope. The imaging method is the same, and the only change is in the power of the lens used. As regards a co-ordinate system, Bacus does not use intrinsic co-ordinates of the object or of the image made from the object mounted on the slide. As clearly stated in Bacus column 9 line 42, the co-ordinate system he uses are in fact X and Y co-ordinates of the microscope stage. This is sufficient for Bacus where the different images are simply the same mounting imaged with different magnification lenses. The slide is not moved in the meantime and therefore if the operator selects a point on the image taken from one magnification, the selected point is simply translated to the corresponding X-Y co-ordinates of the stage.

In the present invention however, the possibility is provided of moving the slide, imaging it using a different technique, restaining it and the like. The slide may be removed and then replaced on the stage in the meantime and may thus have moved with respect to its original position. The invention therefore provides a co-ordinate system which is intrinsic to the image. For example the corner of the slide might be used as an origin of the co-ordinate system. Consequently it makes no difference how carefully the slide is replaced on the stage.

In fact, making the co-ordinate system dependent on the image data including the slide, provides a further advantage. It means that the initial image can be taken on one microscope and the second image on another microscope. This is especially useful if the two imaging techniques cannot be carried out on

the same microscope. The current art does not allow for integrated navigation between two images from different microscopes.

In the present invention, the co-ordinate system works *after* the slide has been *moved* and *replaced*, and *between two microscopes*. In Bacus the co-ordinate system does neither of these since the co-ordinate system is based on the *stage of the microscope*.

An example of two processes for which the co-ordinate system of the present invention is very helpful in matching between is as follows:

In a first imaging process, the specimen may be prepared using a fluorescent marker to obtain a fluorescent image giving morphological information of the specimen. In a subsequent imaging process a DNA marker may be applied and genetic information may be obtained from the same specimen. The morphological and genetic information may then be viewed side by side with matching over the two images using the intrinsic co-ordinate system. It is again stressed that neither Bacus nor any other of the prior art citations reveals how to co-ordinate between the two images because of movement between the two imaging processes or indeed their being imaged on two separate devices.

Thus the feature of the newly amended claim that the co-ordinate system is *intrinsic to the image* is not taught or even suggested in Bacus.

The above defined missing information is also not taught in Kley or in Engelhardt.

Boon likewise does not teach using features *on the specimen itself* to match between different images.

As discussed in the previous response, Kley discloses a system giving selectable illumination systems on a single microscope device for viewing an object under different desired illumination conditions. Kley therefore goes beyond Bacus in providing not just different resolution images of the same object, but images produced in different ways. However, because the images are produced in different ways, there is no integration between the different illumination systems. That is to say the different images produced are fully unconnected images and there is no attempt made to select a co-ordinate in one image and find the same region on the next.

Engelhardt discloses a method of finding recording and optionally evaluating object structures, especially on slides, preferably of fluorescent feature structures such as gene spots. The disclosure teaches using illumination patterns to find features of interest and also teaches using two illumination sources simultaneously on the same object. It does not however teach a co-ordinate system which allows a feature on one image to be found on a second image. It certainly does not teach a co-ordinate or any other kind of reference system which is intrinsic to the object or image. Furthermore it neither teaches nor suggests using features *on the sample itself* to track between two differently obtained images of the same sample.

It is thus submitted that neither Kley nor Bacus nor Engelhardt disclose the key point that image location data is gathered which is intrinsic to the image itself *by being based on features on the sample* so that images from two different image gathering operations can be compared. Such a point is believed to be clearly claimed in claim 1 as amended.

In the present invention, the location data is gathered using intrinsic location data of the image based on the slide *and then* on the sample itself, and is thus independent of the image gathering method or of the location of the slide on the stage

contrary to the teaching in Bacus. The prior art neither discloses nor hints at such a way of registering between two images of the same object.

Furthermore, a particularly preferred embodiment of the present invention can be applied to a standard microscope and does not require any special hardware.

As was pointed out in the previous response, in the field of microscopy it is common to carry out investigations simultaneously using different imaging methods. Navigating between the different images is a task that has for many years had to be carried out manually and has been the bane of many biological researchers. The invention of Kley, made in 1980, allowed for different illumination methods to be available on the same device, but did not include any integration between the images. There has been a long-felt want for a solution that allowed automatic navigation between the different images, and the hardware of Kley has existed for twenty three years, yet the application of the co-ordinate system of Bacus to the hardware of Kley would not arrive at a solution to this problem because as soon as the object is removed for restaining or the like, the stage based co-ordinate system of Bacus can no longer register the images. There is no additional information in Engelhardt which allows this problem to be solved since Engelhardt does not mention any kind of co-ordinate system.

Corresponding amendments have been made to each of the other independent claims so that they all now define a co-ordinate or indexing system which is intrinsic to the object or the corresponding image data.

Likewise the information missing in the above-discussed references is not found in Yamamoto, since, once again, Yamamoto does not teach use of features on the sample itself as a location guide for following between two images of the same sample.

It is therefore concluded that the independent claims are both novel and inventive in light of the combination of Bacus Kley, Boon, Yamamoto and Engelhardt and that the Examiner's objection is overcome.

The dependent claims are believed to be allowable as being dependent on allowable main claims.

Claims 32 and 50 remain rejected over the combination of Bacus, Kley and Engelhardt and additionally in light of Spigarelli. These claims are however believed to be allowable as being dependent on allowable main claims.

All of the matters raised by the Examiner have been dealt with and the rejections are believed to have been overcome. Thus the application is believed to be in order for allowance.

In view of the above amendments and remarks it is respectfully submitted that all the pending claims are all now in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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